

U.S. Application Serial No.: 10/636,308
Amendment dated August 3, 2005
In response to Office Action dated May 3, 2005

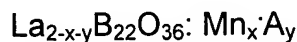
Amendments to the specification:

Please amend the paragraph on page 1, lines 8- 14, as follows:

The present invention relates to the preparation and growth of small size particles Mn^{2+} and alkali-halide doped lanthanum aluminate phosphor by solid-state state and sol-gel methods. More specifically, the present invention provides green emitting Mn^{2+} and alkali-halide doped lanthanum aluminate phosphor and process by thermally decomposing salts of lanthanum, manganese, alkali-halide and alumina or sol-gel powders.

Please amend the paragraph on page 5, lines 9- 16, as follows:

Accordingly, it is an object of the present invention to provide a phosphor and method of preparation of manganese activated and alkali-halide lanthanum aluminate phosphor having the empirical formula:



wherein: A = Li, Na or K; B = Al or Al+Ga; and $0.01 \leq x \leq 0.1$ and $0.01 \leq y \leq 0.1$.

Please amend the paragraph on page 6, lines 1-5, as follows:

The present invention also provides comparative performance data on the lanthanum aluminate phosphors that are activated with manganese (Mn^{2+}) and alkali

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halide such as lithium (Li^+) synthesized by two different processes: conventional solid-state reaction process (0.1 to 10 microns) and sol-gel process (0.01 to 5 microns).

Please amend the paragraph on page 7, lines 2-3, as follows:

Fig. 3 ~~illustrates is a scanning electron micrographs~~ micrograph of Mn and Li activated lanthanum aluminate phosphors.

Please amend the paragraph on page 8, lines 3-15, as follows:

The present invention provides a method of preparation and growth of small size particles Mn^{2+} and alkali-halide doped lanthanum aluminate phosphor, particularly green emitting Mn^{2+} and alkali-halide doped lanthanum aluminate phosphors, by solid state and sol-gel methods. The method includes the steps of thermally decomposing salts of lanthanum, manganese, alkali halide and alumina or sol-gel powders obtained from dilute solution comprising a source of an lanthanum, a source of manganese and an organic precursor providing a source of aluminum, in an acid medium (sol-gel process) or xerogel powder (drying gel from sol-gel process at room temperature) or aerogel powder (drying the gel from sol-gel in vacuum); or gel powder obtained by spray drying, at temperature (1000 to 1400C) for 2 to 6 hours in air and refired at 1000-1300°C in presence of forming gas (95.5% N_2 and 4.5% H_2) for 2 to 6 hours.

Please amend the paragraph on page 9, lines 22-29, as follows:

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The green phosphor according to the present invention is capable of absorbing the photons of vacuum ultra violet light and converts into photons of visible light and is suitable to use in lamps and displays. Further, the small size phosphor particles are particularly suitable for use in applications in which a high packing density is required. The result of this development effort is the basis of the present invention. This invention provides Mn^{2+} and ~~alkali halide~~⁴⁺ alkali¹⁺ activated lanthanum aluminate phosphor, method of synthesizing and uses the same in PDP's.

Please amend the paragraph on page 10, lines 1- 10, as follows:

~~mixing an alkali metal salt as a source of alkali metal, manganese salt as a source of manganese, lanthanum salt as a source of lanthanum and a alumina as source of aluminum;~~

reacting a dilute solution comprising a source of alkali halides, a source of lanthanum, a source of manganese and an organic precursor providing a source of aluminum, in an acid medium to form a gel;

converting ~~said~~ the gel into a gel powder by removing excess water; and
thermally decomposing the powder at specified temperatures to produce ~~said~~ the phosphor.

Please amend the paragraph on page 10, line 18-24, as follows:

The gel can be sprayed ultrasonically and dried, i.e., spray dried, to form a gel powder or vacuum dried to form the gel powder as an aerogel prior to thermal

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decomposition. According to the method of the present invention, the gel can be spray dried to form gel powder and the gel powder can be crushed to form a powder prior to thermal decomposition. Alternatively, the gel can be sprayed ultrasonically and dried to form gel powder and the gel powder can be crushed to form a powder prior to thermal decomposition. The gel can also be dried to form a xerogel and the xero-gel can be crushed to form a powder prior to thermal decomposition. The gel can be thermally decomposed in an open atmosphere at a temperature from about 1000°C to about 1400°C and then at a temperature from about 1000°C to about 1300°C in forming gas.

Please amend the paragraph on page 13, line 5-8, as follows:

Preferably, the phosphor has from about 1.8 mole to about 1.98 mole of lanthanum, from about 0.01 mole to about 0.1 mole of manganese, and about 0.01 mole to about 0.1 mole of alkali-halide and 22.0 mole of aluminum.

Please amend the paragraph on page 14, line 1-6, as follows:

Fig. 3 ~~illustrates~~ is a scanning electron micrographs micrograph of Mn and Li activated lanthanum aluminate phosphors. The scanning electron micrographs of phosphor samples prepared from inorganic salts are studied with the help of Hitachi S-4500 scanning electron microscope. Referring to the ~~photomicrographs~~ micrograph in Fig. 3, one can observe that the phosphor particles are very uniform in size and well crystallized.